

**IN THE CLAIMS**

Please cancel claims 16, 17, 56, 77 and 79 without prejudice or disclaimer, and amend claims 10, 20 and 22, as follows:

1           Claims 1-6. (Canceled)

1           7. (Previously Presented) A cathode for an electron tube, comprising:

2           a metal base; and

3           an electron-emitting material layer coated on the metal base, said electron-emitting  
4           material layer comprising a needle-shaped conductive material;

5           said needle-shaped conductive material being at least one material selected from a  
6           group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,  
7           molybdenum and platinum;

8           said needle-shaped conductive material being a carbonaceous material, said needle-  
9           shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight  
10           of said electron-emitting material layer, and a thickness of said electron-emitting material  
11           layer being in a range of 30 to 80  $\mu\text{m}$ .

Claims 8-9. (Canceled)

1           10. (Currently Amended) A cathode for an electron tube, comprising:

2           a metal base; and

3           an electron-emitting material layer coated on the metal base, said electron-emitting  
4           material layer comprising a needle-shaped conductive material and having a surface  
5           roughness corresponding to a distance between a highest point and a lowest point on a  
6           surface of the electron-emitting material layer being less than 10 microns;

7           wherein said needle-shaped conductive material in the electron-emitting material  
8           layer is in a range of 0.01 to 30% by weight based on a total weight of said electron-emitting

9       material.

Claim 11. (Canceled)

1       12. (Previously Presented) A cathode for an electron tube, comprising:  
2       a metal base; and  
3       an electron-emitting material layer coated on the metal base, said electron-emitting  
4       material layer comprising a needle-shaped conductive material;  
5       said needle-shaped conductive material being at least one material selected from a  
6       group consisting essentially of indium tin oxide, nickel, magnesium, rhenium, molybdenum  
7       and platinum.

Claims 13-19. (Canceled)

1       20. (Currently Amended) [[The]] A cathode of claim 10, further comprising for an  
2       electron tube, comprising:  
3       a metal base;  
4       an electron-emitting material layer coated on the metal base, said electron-emitting  
5       material layer comprising a needle-shaped conductive material and having a surface  
6       roughness corresponding to a distance between a highest point and a lowest point on a  
7       surface of the electron-emitting material layer being less than 10 microns; and  
8       a metal layer including nickel grains having sizes smaller than sizes of grains in said  
9       metal base, said metal layer being formed between said metal base and said electron-emitting  
10      material layer.

1       21. (Previously Presented) The cathode of claim 20, said metal layer further including  
2       at least one metal selected from a group consisting essentially of aluminum (Al), tungsten  
3       (W), tantalum (Ta), chromium (Cr), magnesium (Mg), silicon (Si) and zirconium (Zr).

1           22. (Currently Amended) [[The]] A cathode of claim 10, further comprising for an  
2 electron tube, comprising:

3           a metal base;

4           an electron-emitting material layer coated on the metal base, said electron-emitting  
5 material layer comprising a needle-shaped conductive material and having a surface  
6 roughness corresponding to a distance between a highest point and a lowest point on a  
7 surface of the electron-emitting material layer being less than 10 microns; and

8           a metal layer formed between said metal base and said electron-emitting material  
9 layer, a thickness of said metal layer being in a range of 1 to 30  $\mu\text{m}$ .

Claims 23-28. (Canceled)

1           29. (Previously Presented) An oxide cathode for an electron tube, comprising:

2           a metal base; and

3           an electron-emitting material layer coated on the metal base, said electron-emitting  
4 material layer comprising a needle-shaped conductive material;

5           said needle-shaped conductive material being at least one material selected from a  
6 group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium,  
7 molybdenum and platinum;

8           said needle-shaped conductive material being a carbonaceous material, said needle-  
9 shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight  
10 of said electron-emitting material layer, and a thickness of said electron-emitting material  
11 layer being in a range of 30 to 80  $\mu\text{m}$ .

Claims 30-47. (Canceled)

1           48. (Previously Presented) A cathode, comprising:

2           a metal base;

3           layer means disposed upon said metal base for emitting electrons; and

4           additional means for providing electrically conducting paths through said layer means  
5           for emitting electrons, said additional means comprising a needle-shaped electrically  
6           conductive material having a specific resistance not greater than  $10^{-1}$  ohms centimeter, and  
7           comprising 0.01% by weight to 30% by weight of said layer means.

1         49. (Previously Presented) The cathode of claim 48, further comprising a metal  
2           layer exhibiting a grain size smaller than said metal base and interposed between said metal  
3           base and said layer means.

1         50. (Previously Presented) The cathode of claim 48, said needle-shaped conductive  
2           material being selected from a group consisting essentially of carbon, indium tin oxide,  
3           nickel, magnesium, rhenium, molybdenum and platinum.

1         51. (Previously Presented) A cathode, comprising:

2           a metal base;

3           a layer of electron-emitting material disposed upon said base; and

4           a needle-shaped electrically conductive material providing electrically conductive  
5           paths disposed throughout said layer of electron-emitting material;

6           said needle-shaped electrically conductive material having a specific resistance not  
7           greater than  $10^{-1}$  ohms centimeter.

1         52. (Previously Presented) The cathode of claim 51, further comprising a metal  
2           layer exhibiting a grain size smaller than said metal base and interposed between said metal  
3           base and said layer of electron-emitting material.

1         53. (Previously Presented) The cathode of claim 51, said conductive material

2 comprising 0.01% by weight to 30% by weight of said layer of electron-emitting material.

Claim 54. (Canceled)

1       55. (Previously Presented) The cathode of claim 51, said layer of electron-emitting  
2 material having a surface roughness corresponding to a distance between a highest point and  
3 a lowest point on a surface of the electron-emitting material being less than 10 microns.

Claim 56. (Canceled)

1       57. (Previously Presented) A cathode, comprising:  
2           a metal base; and  
3           a layer disposed upon said metal base;  
4           said layer comprising an electron-emitting material, and a needle-shaped electrically  
5           conductive material disposed within said layer and having a specific resistance less than a  
6           specific resistance of said electron-emitting material.

1       58. (Previously Presented) The cathode of claim 57, said needle-shaped electrically  
2           conductive material providing electrically conductive paths in said layer.

1       59. (Previously Presented) The cathode of claim 57, said layer having a surface  
2           roughness corresponding to a distance between a highest point and a lowest point on a  
3           surface of the electron-emitting material being less than 10 microns.

1       60. (Previously Presented) The cathode of claim 57, said conductive material  
2           having a specific resistance not greater than  $10^{-1}$  ohms centimeter.

1       61. (Previously Presented) The cathode of claim 57, said layer having a thickness

2       in a range of 30 microns to 80 microns.

1           62. (Previously Presented) The cathode of claim 57, said conductive material  
2       comprising 0.01% by weight to 30% by weight of said layer.

1           63. (Previously Presented) A cathode, comprising:  
2       a metal base; and  
3       a layer disposed upon said base;  
4       said layer comprising an electron-emitting material, and a needle-shaped electrically  
5       conductive material having a specific resistance not greater than  $10^{-1}$  ohms centimeter.

1           64. (Previously Presented) The cathode of claim 63, further comprising a metal  
2       layer having a grain size smaller than a grain size of said metal base, and interposed between  
3       said metal base and said layer.

1           65. (Previously Presented) The cathode of claim 63, said conductive material  
2       comprising 0.01% by weight to 30% by weight of said layer.

1           66. (Previously Presented) The cathode of claim 63, said layer having a surface  
2       roughness corresponding to a distance between a highest point and a lowest point on a  
3       surface of the electron-emitting material being less than 10 microns.

1           67. (Previously Presented) The cathode of claim 63, said layer of electron-emitting  
2       material having a thickness in a range of 30 microns to 80 microns.

1           68. (Previously Presented) A cathode, comprising:  
2       a metal base;  
3       a layer of electron-emitting material including an electron-emitting barium-based

4       alkali-earth metal carbonate material disposed upon said base; and  
5              a needle-shaped electrically conductive material providing electrically conductive  
6       paths in said layer of electron-emitting material;  
7              said conductive material having a specific resistance not greater than  $10^{-1}$  ohms  
8       centimeter.

1           69. (Previously Presented) The cathode of claim 68, further comprising a metal  
2       layer having a grain size smaller than a grain size of said metal base, and interposed between  
3       said metal base and said layer of electron-emitting material.

1           70. (Previously Presented) The cathode of claim 68, said conductive material  
2       comprising 0.01% by weight to 30% by weight of said metal layer.

Claim 71. (Canceled)

1           72. (Previously Presented) A cathode, comprising:  
2       a metal base; and  
3              a layer formed on said base from a carbonate paste comprising a barium-based  
4       carbonate electron-emitter and a needle-shaped electrically conductive powder;  
5              said needle-shaped electrically conductive powder having a specific resistance not  
6       greater than  $10^{-1}$  ohms centimeter.

1           73. (Previously Presented) The cathode of claim 72, further comprising a metal  
2       layer having a grain size smaller than a grain size of said metal base and interposed between  
3       said metal base and said layer.

1           74. (Previously Presented) The cathode of claim 72, said needle-shaped electrically  
2       conductive powder comprising 0.01% by weight to 30% by weight of said layer.

Claim 75. (Canceled)

1        76. (Previously Presented) The cathode of claim 72, said layer having a surface  
2 roughness corresponding to a distance between a highest point and a lowest point on a  
3 surface of the layer being less than 10 microns.

Claims 77-79. (Canceled)